20.0 ESTIMATING THE EXTENT OF THE POSSIBLE PROBLEM.

20.1 POTENTIAL ANNUAL NUMBERS OF DEATHS ATTRIBUTABLE TO EMFS

Two recent review articles calculated the proportion of all childhood leukemia cases that might be attributed to the rare highest residential EMF exposures. This was estimated to be around 3%. With about 100 childhood leukemia deaths per year, this would translate to about 3 deaths in California per year attributable to EMFs. The evidence does not permit similar direct calculations for the other reviewed conditions. However, suppose that only 1% of the conditions that were considered in this evaluation (minus those that the three reviewers "strongly believed" were not caused by EMFs) could be attributed to EMF exposure. The numbers of attributable cases could still be in the hundreds per year and comparable to the theoretical burden of ill health that has motivated other environmental regulation (di Bartolomeis, 1994). The annual California deaths from each of these conditions are shown in Table 20.1. The reader can apply 1% to these numbers to verify the assertion in the previous sentence.

TABLE 20.1 1998 YEARLY CALIFORNIA DEATHS (SOME FRACTION OF WHICH MIGHT BE AFFECTED BY EMFS) *

AGE GROUP	CHILD LEUK.	ADULT LEUK.	CHILD BRAIN	ADULT BRAIN	MALE BREAST	FEMALE BREAST	SPONT. ABORT.	ALS	ALZ-HEIMER	SUICIDE	ACUTE M.I.
0-19	99	0	79	0	0	0	11,000	0	0	171	2
29 Plus	0	1,888	0	1,294	30	4,095	49,000	434	320	3,044	17,236

* From http://www.ehdp.com/vn/ro/av/cau1/eg1/index.htm

20.2 POTENTIAL ADDED LIFETIME RISK FROM HIGH EXPOSURE

Since epidemiology is a blunt research instrument, the theoretical lifetime individual risk that derives from any agent that has an epidemiologically detectable effect will be automatically greater than the lifetime risk of 1/100,000 that triggers many regulatory processes. This means most of the epidemiological associations examined in this document could clearly be of regulatory concern if real.

That being said, with the exception of miscarriage, the theoretical lifetime risks from the highest EMF exposures are such that, depending on the disease and assuming relative risks ranging from 1.2 to 2.0, 93% to 99.9% of even highly exposed individuals would escape contracting the non-miscarriage health conditions studied.

These insights are illustrated in Table 20.2

TABLE 20.2 ADDED LIFETIME RISK IMPLIED BY RELATIVE RISKS OF 1.2 OR 2.0 FOR RARE AND COMMON DISEASES

ANNUAL INCIDENCE	DISEASES IN CATEGORY	ADDED ANNUAL RISK FROM: RR = 1.2; RR = 2.0	ADDED LIFETIME RISK FROM: RR = 1.2, RR = 2.0	LIFETIME CHANCE OF ESCAPING DISEASE AFTER EXPOSURE
1/100,000	ALS, Male Breast Cancer	0.2/100,000; 1/100,000	1.4/10,000; 7/10,000	99.99% ; 99.93%
5/100,000	Child Leukemia	1/100,000; 5/100,000	2/10,000 ; 10/10,000	99.98%; 99.9%
10/100,000	Suicide, Adult Brain & Leuk.	2/100,000; 10/100,000	14/10,000; 70/10,000	99.9%; 98.3%
100/100,000	Acute Myocardial Infarction	20/100,000; 100/100,000	1.4%; 6.8%	98.6%; 93.2%
1%	Alzheimer's	0.2%; 1%	NA (late onset)	NA
10%	Miscarriage	2%; 10%	NA (occurs during pregnancy)	NA

Two new epidemiology studies (Li et al., 2002), (Lee et al., 2002) suggest that a substantial proportion of miscarriages might be caused by EMFs. Miscarriages are common in any case (about 10 out of 100 pregnancies) and the theoretical added risk for an EMF-exposed pregnant woman may be an additional 10 out of 100 pregnancies according to these two studies. If true, this could clearly be of personal and regulatory concern. However, the type of EMF exposure implicated by the new epidemiological studies (short, very high exposures) probably come primarily from being very close to appliances and indoor wiring, and only rarely from power lines. Seventy-five percent of the women in the studies had at least one of these exposures during a day, and even one exposure a day, if typically experienced during pregnancy, seemed to increase the risk of miscarriage. Nonetheless, the vast majority of pregnant women with such exposures did NOT miscarry.